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SPECIFICATION FOR LEATHER FOR LEG GUARD

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BUREAU OF INDIAN STANDARDS
MANAK BHAVAN, 9 BAHADUR SHAH ZAFAR MARG
NEW DELHI 110002

Gr 4 ***June*** **1967**

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SPECIFICATION FOR LEATHER FOR LEG GUARD

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SPECIFICATION FOR LEATHER FOR LEG GUARD

0. FOREWORD

0.1 This Indian Standard was adopted by the Indian Standards Institution on 5 October 1966, after the draft finalized by the Leather Sectional Committee had been approved by the Chemical Division Council.

0.2 The Sports Goods Sectional Committee, while formulating standards on sports goods as a whole requested the Leather Sectional Committee to take up the formulation of standards on leather for sports goods. This present standard is expected to assist the tanners to offer a suitable leather to the sports goods industry, to help the Sports Goods Export Promotion Council and various Quality Marking Schemes of State Departments in selecting a material of choice controlled by the conditions of national sports or the export market needs.

0.3 It has been found by experience that by treating leather with 0·1 percent of sodium trichlorophenate or sodium orthophenylphenate, based on dry weight of the finished leather, the same could be made effectively mildew resistant without adversely influencing the non-toxic character of the leather. Any other fungicide or a combination of fungicides which is known to be harmless to skin in small dosages should be worked out by trial to arrive at the optimum dosage of fungicides so as to cause no growth of mildew. Extreme caution is to be exercised since the excess dosage of fungicides is harmful which often causes chafing, irritation and dermatitis. To arrive at the optimum dosage of fungicides, the method given in Appendix A may be followed.

0.4 At present, there is no standard method for assessing the perspiration resistance of leather used in leg guard which comes in constant contact with human perspiration. The tentative method found suitable by Central Leather Research Institute, Madras, is given in Appendix C which may be followed in practice subject to agreement between the purchaser and the supplier, to assess the resistance of such leathers to perspiration. At the end of the test, the leather shall not shrink, show stiffness or discolouration to the extent greater than that which has been previously agreed upon between the purchaser and the supplier.

0.5 The requirements given in this standard are based on authentic test data on indigenous sample and samples received by courtesy of the Hungarian Government. The following laboratories took part in the inter laboratory test scheme whose technical collaboration is gratefully acknowledged:

a) Central Leather Research Institute, Madras
b) College of Leather Technology, Calcutta
c) National Test House, Calcutta

0.6 This standard contains clause **6.1** which calls for agreement between the purchaser and the supplier regarding packing of the material.

0.7 For the purpose of deciding whether a particular requirement of this standard is complied with, the final value, observed or calculated, expressing the result of a test or analysis, shall be rounded off in accordance with IS: 2-1960*. The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

1. SCOPE

1.1 This standard prescribes the requirements, methods of sampling and test for full-chrome and vegetable tanned leather for leg guard.

2. TERMINOLOGY

2.1 For the purpose of this standard, the definitions given in IS: 1640-1960† shall apply.

3. TYPES

3.1 There shall be two types of the material as follows:

a) *Type* 1 — Full-chrome tanned (FCT), and
b) *Type* 2 — Vegetable tanned (VT).

4. REQUIREMENTS

4.1 Raw Materials — The material shall be sheepskin, goat skin or cow calf-skin.

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*Rules for rounding off numerical values (*revised*).

†Methods of test for vegetable and chrome tanned leathers.

4.2 Tanning — The material shall be chrome tanned for type 1 leather and vegetable tanned for type 2 leather.

4.3 Fungicide Additives — At the end of tanning operation before drying, suitable fungicides shall be incorporated for both types of leather.

4.3.1 Fungicides used to promote fungi resistance in the leather shall be effective and non-toxic (*see* **0.3**).

4.3.2 Type 1 and type 2 material shall not support mould growth when tested according to the method given in Appendix B.

4.3.3 The material shall show no growth of mildew when examined visually after the completion of the test prescribed in Appendix B.

4.4 Finishing — The material shall be fat liquored or oiled or both, and the grain side shall be smooth finished.

4.5 Physical Requirements — The material shall also comply with the physical requirements given in Table 1.

TABLE 1 PHYSICAL REQUIREMENTS FOR LEATHER FOR LEG GUARD

SL No.	CHARACTERISTIC	REQUIREMENTS FOR		METHODS OF TEST, REF TO	
		Type 1	Type 2	Cl No. in IS: 582-1954*	Appendix
(1)	(2)	(3)	(4)	(5)	(6)
i)	Water absorption, *Max*:				
	a) in 1/2 h	25	40	21·2	—
	b) in 2 h	30	45		
	c) in 24 h	35	50		
ii)	Cracking	Grain shall not crack		22	—
iii)	Stitchtear strength (double hole) kg/cm thickness, *Min*	45	45	—	D
iv)	Shrinkage temperature, *Min*	95°C	77°C	—	E

*Methods of sampling and test for vegetable and chrome tanned leathers.

4.6 Chemical Requirements — The material shall comply with the chemical requirements calculated on 14 percent moisture basis, given in Table 2.

TABLE 2 CHEMICAL REQUIREMENTS FOR LEATHER FOR LEG GUARD

(*Clause* 4.6)

Sl No.	Characteristic	Requirements		Methods of Test, Ref to Cl No. in IS: 582-1954*
		Type 1	Type 2	
(1)	(2)	(3)	(4)	(5)
i)	Total ash, percent by weight, *Max*	—	1·5	7
ii)	Oils and fats, percent by weight, *Min*	3·0	5·0	8
iii)	Cr_2O_3 content, percent by weight, *Min*	2·5	—	9
iv)	Water solubles, percent by weight, *Max*	—	15·0	10
v)	Insoluble ash, percent by weight, *Max*	—	0·5	12
vi)	*p*H of water solubles, *Min*	3·2	3·5	13
vii)	Differential number, *Max*	—	0·6	13
viii)	Degree of tannage, *Min*	—	40	17

*Methods of sampling and test for vegetable and chrome tanned leathers.

5. MARKING

5.1 The leather pieces and/or packages shall be marked with area in dm^2 and weight in kg and the name of the manufacturer; recognized trade-mark, if any, type; month and year of manufacture.

5.2 The leather pieces and/or packages may also be marked with the ISI Certification Mark.

NOTE — The use of the ISI Certification Mark is governed by the provisions of the Indian Standards Institution (Certification Marks) Act, and the Rules and Regulations made thereunder. Presence of this mark on products covered by an Indian Standard conveys the assurance that they have been produced to comply with the requirements of that standard, under a well-defined system of inspection, testing and quality control during production. This system which is devised and supervised by ISI and operated by the producer, has the further safeguard that the products as actually marketed are continuously checked by ISI for conformity to the standard. Details of conditions, under which a licence for the use of the ISI Certification Mark may be granted to manufacturers or processors, may be obtained from the Indian Standards Institution.

6. PACKING AND PACKAGING

6.1 The leather pieces shall be packed as agreed to between the purchaser and the supplier.

7. SAMPLING AND CRITERIA FOR CONFORMITY

7.1 Scale of Sampling — Samples for ascertaining conformity of the material to this specification shall be taken in accordance with the procedure as prescribed in IS: 582-1954*.

7.2 Position of Sampling

7.2.1 *Sampling Position for Chemical Tests* — Sampling position for chemical analysis shall be as prescribed in IS : 582-1954*.

7 2.2 *Sampling Position for Physical Tests* — Sampling position for physical tests shall be as prescribed in Appendix F.

7.3 Examination for Visual Requirements — All the pieces in the sample selected from a lot shall be individually examined for visual requirement regarding the finishing of leather. If any piece is found to be defective, the entire lot shall be screened in respect of the visual requirement in order to remove all the defective pieces from the lot.

7.4 Tests for Physical Requirements — Each piece in the sample shall be tested for all the physical requirements individually. The lot shall be considered to have met the physical requirements if each piece individually satisfies every one of these requirements; otherwise the lot shall be rejected without further testing.

7.5 Tests for Chemical and Resistance to Mould Growth Requirements — If the lot has been found satisfactory in respect of physical requirements, it shall be subjected to the tests for all other requirements of this specification. The lot shall be declared to have met the requirements of this specification if all the test results, obtained by following the specified testing procedure, satisfy the relevant requirements of this specification.

8. TEST METHODS

8.1 Tests shall be carried out as prescribed in IS : 582-1954* and Appendices to this standard. References to the relevant clauses of IS: 582-1954* are given in col 5 of Tables 1 and 2 and reference to Appendices are given in col 6 of Table 1.

8.2 Standard Atmospheric Conditions for Physical Tests — The test specimens shall be conditioned to a moisture equilibrium in an atmosphere of 65 ± 2 percent relative humidity and 27° ± 2°C temperature (*see* IS:196-1966†) and, if possible, test in that atmosphere or soon after removal from that atmosphere.

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*Methods of sampling and test for vegetable and chrome tanned leathers.

†Atmospheric conditions for testing (*revised*).

8.3 Quality of Reagents — Unless specified otherwise, pure chemicals and distilled water (*see* IS : 1070-1960*) shall be employed in tests.

NOTE — 'Pure chemicals' shall mean chemicals that do not contain impurities which affect the results of analysis.

APPENDIX A

(*Clause* 0.3)

METHOD TO DETERMINE OPTIMUM DOSAGE OF FUNGICIDES IN TREATING LEATHERS

A-1. PROCEDURE

A-1.1 Treat a 50-mm^2 sample with a standard spore suspension and observe the growth of mildew in accordance with the method prescribed in Appendix B. At the end of the prescribed period, the sample may have vigorous, moderate, slight or very slight growth of mildew as defined below:

a) Vigorous — Entire surface of leather covered with mildew in test period,
b) Moderate — Three-fourths of the surface of leather covered with mildew in test period,
c) Slight — Half of the surface of leather covered with mildew in test period,
d) Very slight — One-fourth of the surface of leather covered with mildew in test period, and
e) Negative — No growth of mildew.

A-1.2 Treat the leather with fungicides to such an extent that no growth of mildew is just observed on the leather, the efficiency of the fungicide treatment is best judged by the performance of the treated leather following the above procedure when subjected to mildew growth test and improvement made till no growth is obtained.

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*Specification for water, distilled quality (*revised*).

APPENDIX B

(*Clause* 4.3.2)

TEST FOR MILDEW RESISTANCE

B-1. OUTLINE OF THE METHOD

B-1.1 Untreated leathers as well as leathers treated with agents to promote mould resistance are smeared, sprayed or swabbed with mixed spore suspension of species of mould found in tanned leathers and the resistance of such leathers to the growth of moulds is evaluated.

B-1.1.1 Conditions prescribed for preparation of specimens in this test method correspond to the conditions to which leathers are subjected in use and normal storage.

B-2. TEST PIECES

B-2.0 The test pieces shall be treated as follows.

B-2.1 The specimens from one portion *A* are kept for seven days at 45° ± 2°C in an oven with forced air circulation and leached by drumming for three hours in about 30 times their weight of water at 27° ± 2°C (*see* IS : 196-1966*). The leached specimens are then drained and blotted.

B-2.2 The second portion *B* of the specimens is tested as received.

B-3. APPARATUS

B-3.1 Containers for Keeping Test Pieces — Any suitable glassware which may be conveniently stoppered, namely, jars, desiccators, glass tanks, etc, with greased covers to preclude loss of water vapour during the test may be used. The vessel may contain water at the bottom or cotton wool or clean sand previously saturated with boiling water. This is done to obtain 100 percent relative humidity at approximately 30°C.

NOTE — The same vessel shall not be used for simultaneous testing of specimens treated with different fungicides.

B-3.2 Incubator — One capable of maintaining 45° ± 2°C with forced air circulation and another capable of maintaining 30° ± 2°C.

---

*Atmospheric conditions for testing (*revised*).

B-4. REAGENTS

B-4.1 Standard Mixed Spore Suspension — Standard mixed spore sand suspension (*see* Note) of the following cultures of species of moulds should be used in the test:

Asperigillus niger
Asperigillus flavus
Asperigillus terreus
Asperigillus nidulans
Penicillium frequentans
Paecilomyces varioti

With each batch of such a suspension a list showing the organisms incorporated therein as well as the date prior to which the culture is to be used shall be furnished.

NOTE — At present only sand suspension of spore of species of moulds usually found in tanned leathers are supplied by Central Leather Research Institute, Madras.

B-5. PROCEDURE

B-5.1 Cut four strips of 50 × 10 mm from the treated specimens (*see* **B-2**). Dampen with sufficient water for about five minutes, smear, spray or swab with mixed spore suspension and subsequently suspend them above a free water surface in a suitably covered vessel as described under **B-3.1**.

B-5.2 Viability Control — Simultaneously, tests shall be carried out with control specimens of leather not treated with fungicide. If this untreated material fails to show any abundant growth of the test organism, the test shall be considered inconclusive and whole test be repeated.

B-5.3 Incubation — Incubate the specimens for 30 days at 30° ± 2°C and 95 to 100 percent relative humidity in the incubator (*see* **B-3.2**) or humidity cabinet, kept in the dark.

B-5.4 The specimens shall be examined at frequent intervals, at least once a week and the date of the first appearance of mould growth shall be noted.

B-6. ASSESSMENT OF RESISTANCE TO MOULD ATTACK

B-6.1 Presence or absence of mould growth as well as the extent of growth at the end of the incubation period may be assessed visually and indicated in the test report as vigorous (entire surface of test piece covered with mildew in test period), moderate (three-fourths of the surface of test piece covered with mildew in test period), slight (half of the surface of test piece covered with mildew in test period) very slight (one-fourth of the surface of test piece covered with mildew in test period) and nil (no growth of mildew).

B-6.1.1 The test report shall also state the following:

a) The number of specimens tested;
b) Nature of the specimens tested, *A* (*see* **B-2.1**) or *B* (*see* **B-2.2**);
c) The date of incubation; and
d) The date of first appearance of mould growth.

APPENDIX C

(*Clause* 0.4)

METHOD FOR DETERMINATION OF PERSPIRATION RESISTANCE OF LEATHER

C-1. REAGENTS

C-1.1 Artificial Perspiration Solution

Urea crystals	1·67 g
Sodium lactate, 60 percent syrum	100·00 g
Disodium phosphate	0·417 g
Sodium chloride	9·45 g
Water	To make one litre

C-1.1.1 Adjust the *p*H to 7·0 ± 0·1 with ammonium carbonate or lactic acid.

C-2. PROCEDURE

C-2.1 Soak 50 × 75 mm leather specimens with occasional flexing for 2 hours in the perspirant solution. Preheat large, rectangular, heat-resistant glass jars and covers at 70°C and hung the leather specimens on glass rod within the jars containing 100 ml of water at 70°C. Seal the jars tightly with plate glass covers and place in the oven at 70°C for 48 hours. Remove the leather specimens and air dry them at room temperature. Bend the specimens slowly with the grain side out through 180° over a mandrel of 50 mm diameter.

C-3. EXPRESSION OF RESULTS

C-3.1 Examine the bent specimens for cracks. Assess them according to their resistance to cracking as follows:

Poor — Cracks completely across the specimen,
Fair — Cracks approximately one half across the specimen,
Good — Cracks only at the edge of the specimen, and
Very good — No cracks formed.

APPENDIX D

[*Table* 1, *Item* (iii)]

TEST FOR STITCHTEAR STRENGTH (DOUBLE HOLE)

D-1. SCOPE

D-1.1 This method is intended for determining the stitchtear strength of the leather using a double hole test. It is particularly applicable to lightweight leather.

D-2. APPARATUS

D-2.1 Metal Wire — A piece of soft steel wire 1 ± 0·025 mm in diameter and not less than 100 mm in length.

D-2.2 Means to Make Double Hole — A punch or some other instrument for making a hole 2 mm in diameter in the specimen.

D-2.3 Testing Machine — It shall be similar to the machine used for testing tensile strength as prescribed in IS: 582-1954* except that the jaws of the grips of the machine shall be covered with a material suitable for protecting the gripping surface from possible damage to the metal wire.

D-3. TEST PIECE

D-3.1 The specimen shall be a rectangular piece of leather free from mechanical damage and defects 50 mm in length and 25 mm in width, cut from the test position of leather.

D-4. PROCEDURE

D-4.1 The specimen shall be free from mechanical damage and defects. Punch two holes each 2 mm in diameter as shown in Fig. 1. Make the wire metal into U-shape and pass through the two holes so that both ends project from the flesh side of the specimen. Clamp the ends of the wire in the wrapped grips of the testing machine. Grip the free end of the specimen in the other grip of the machine described in **D-2.3**. Pull the specimen at such a rate that the actuated grip travels at a uniform speed of 25 ± 5 cm/min. Note the force required to tear the specimen at the moment of the initial tear of the specimen.

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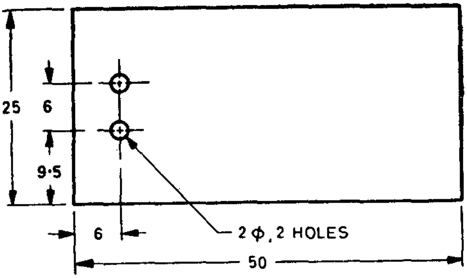
*Methods of sampling and test for vegetable and chrome tanned leathers.



All dimensions in millimetres.

FIG. 1 DIMENSIONS OF TEST PIECE FOR STITCHTEAR STRENGTH

D-5. RESULTS

D-5.1 Test one specimen, cut out of the material from the sample location for physical tests (*see* **F-1.1.2**).

D-5.2 Average the test results obtained from three specimens and calculate the stitchtear resistance in kg/cm thickness of the material.

D-5.3 Record stitchtear strength of the material to the nearest 0·5 kg.

APPENDIX E

[*Table* 1, *Item* (iv)]

TEST FOR SHRINKAGE TEMPERATURE

E-0. PRINCIPLE OF THE METHOD

E-0.1 The thermal stability of the leather depends on the nature and extent of tannage and consequently shrinkage temperature is a direct measure of the same.

E-1. APPARATUS

E-1.1 The apparatus consists of the following essential parts.

E-1.1.1 *Beaker* — one litre capacity.

E-1.1.2 *Clamps* — two suitable clamps to hold the specimen. The upper clamp shall be capable of moving and lower clamp shall be stationary.

E-1.1.3 *Heating Device*

E-1.1.4 *Indicating Device* — An indicating device which keeps the specimens in position and accurately detects and magnifies by at least 25 times any shrinkage or swelling of the specimen. In no case the device shall cause an elongation of more than 10 percent of the specimen prior to shrinkage.

E-1.1.5 *Stirrer* — a suitable mechanical stirrer.

E-1.1.6 *Thermometer* — a suitable thermometer reading up to 150°C.

E-2. PROCEDURE

E-2.1 Preparation of Test Specimen — Cut from the relevant portion (*see* **7.2.2**) a specimen 10×60 mm.

NOTE — Degrease the sample with petroleum ether for 24 hours at room temperature, free it from solvent and then proceed with the experiment.

E-2.2 Mount the clamps one over the other 50 mm apart, with the bottom one stationary. Attach the indicating device to the upper (movable) clamp. Place the specimen in the clamps, completely immerse in the water at $27° \pm 2°$C and allow it to remain until the water has thoroughly penetrated the specimen. Adjust the indicator to a reference or zero point so that the eventual shrinkage may be readily detected. Stir the water while being heated at a rate of 3° to 5°C per minute. As the temperature rises, swelling of the specimen may occur. If this happens, again adjust the indicator to a reference or zero point. Record the temperature of the water at which the specimen begins to shrink.

APPENDIX F

(*Clause* 7.2.2)

SAMPLE FOR PHYSICAL TESTS

F-1. LOCATION OF PIECES FOR PHYSICAL TESTS

F-1.1 The location shall be selected from the leather in the manner described in **F-1.1.1** and Fig. 2.

F-1.1.1 A hide is represented in Fig. 2 with the head portion removed. *B* is the root of the tail, *C* is the farthest point on the backbone at the neck portion, *A* is a point on the backbone such that *AC* is equal to 2*AB*. *AD*

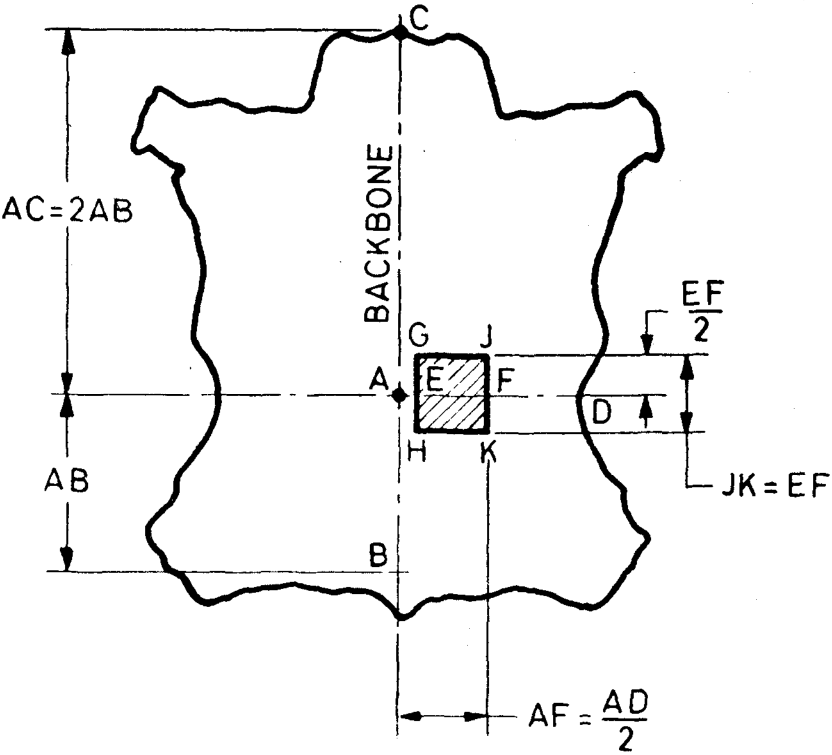


Fig. 2 Sample Location

is a line perpendicular to BC. F is the mid-point of AD and AE is of length 50 mm. The lines GH and JK, whose mid-points are E and F respectively, are parallel to BC and each of length equal to EF.

F-1.1.2 The pieces for physical tests shall be cut from the square $HKJG$.

F-2. SAMPLE CUTTING BY PRESS KNIFE

F-2.1 Press Knife — The internal surfaces of each press knife shall be normal to the plane which contains the cutting edge. The angle formed at the cutting edge between the internal and external surfaces of the press knife shall be approximately 20° and the wedge of this angle shall be of a depth exceeding the thickness of leather (*see* Fig. 3).

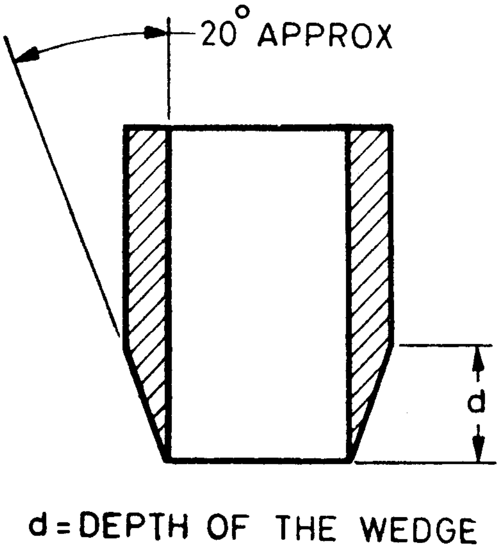


FIG. 3 SHAPE OF PRESS KNIFE

F-2.2 Method of Cutting Sample — In cutting the samples, the knife shall be applied to the grain surface. To obtain cleanly cut sample pieces for physical tests, the press knife used shall be sharp. It is advantageous to place a thick sheet of paper between the sample and the cutting board.

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Institution of Engineers (India) Building, 1332 Shivaji Nagar, PUNE 410005	5 24 35

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*Sales Office in Bombay is at Novelty Chambers, Grant Road, Bombay 400007 89 65 28

†Sales Office in Calcutta is at 5 Chowringhee Approach, P. O. Princep Street, Calcutta 700072 27 68 00

Reprography Unit, BIS, New Delhi, India